Teridian 73S1215
Development Toolkit

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73S1215 Development Toolkit

The Teridian 73S1215F development toolkit can be used to evaluate the performance and features of the 73S1215F and provides a development platform for a USB, PIN-pad smart card reader. The kit includes an **Evaluation Board** based on an actual 73S1215F IC, a JTAG **In-Circuit-Emulator** (ICE), and a **CDROM** that contains Teridian API libraries, software reference design and driver, documentation and more.

The evaluation board features 2 smart card slots (the 2nd being driven by an on-board Teridian 73S8010R electrical interface), a PINpad, an LCD screen (2 lines of 16 characters, 5x7 dot matrix using an integrated driver SAMSUNG type KS0066), USB and RS232 connectivity, as well as a breadboard area (with access to user I/Os, LED outputs, and to the analog input) for prototyping. The board has a convenient connector for the JTAG ICE that allows real-time debugging of custom applications (firmware).

The JTAG **In-Circuit-Emulator** (ICE) is a Signum™ ADM51 that is specifically designed to operate with Teridian 80515 System-on-Chips.

The CDROM contains the 73S1215 API libraries written in C language that offer low and high-level functions to access and control all the 73S1215 blocks and features. In particular, the ICC (Interface Circuit Card) and USB API functions implement the protocol layers to communicate with smart cards (T=0 and T=1 protocols) and with USB respectively. These libraries fully comply with ISO7816 and EMV 4.1 (level 1) for the smart card, and with PC/SC and Microsoft WHQL test suites for the USB. Other API functions include management of the controller (clocks, RTC, timers, power management, interrupts), control of the LCD & PINpad, of the various I/Os (user I/Os, PINpad, LEDs, analog input). In addition, the CDROM includes the source code for a CCID reference design (i.e. the 73S1215 embedded application), which implements an USB-connected smart card reader compatible with Windows™ CCID driver. The application also supports multiple smart card slots, LCD and PINpad, that are not supported by Windows™ CCID driver. In this case, Teridian CCID driver (also included in the CDROM) must replace the standard Windows™ CCID driver in the PC side.

This CCID reference design can either be used as a turnkey solution, or as a basis for custom developments.

The Teridian libraries and reference designs have been developed using the 8051 development environment from Keil®, including C-compiler. It is strongly recommended to use the same environment, version C51V6.21 or higher to develop 73S1215-embedded applications either in C or assembly code (the Keil® environment is not included in the kit).

73S1215F Flash Programmer

Teridian 73S1215F (Flash) integrated circuit can be programmed using the JTAG In-Circuit-Emulator (ICE) included in the toolkit. Alternatively, Teridian offers a cost-effective programming tool, more suitable to production line requirements: **The Teridian Flash programmer model TFP1** can be used in the production line or in the field to program 73S1215F devices through the JTAG interface. Teridian programmer can be configured as a standalone tool, controlled from a PC, or even controlled from an Automated Test Equipment (ATE).

Low-Cost 24MIPS, 8-bit SoC Smart Card Reader with USB, PIN-pad, and more…

Key Applications

- Smart card reader modules for PC laptops and desktops:
  - ExpressCard™
  - USB

- Handheld PINpad smart card readers
  - Battery or USB powered
  - Connected (USB and/or serial)

- General purpose smart card readers

The 73S1215F inaugurates the 73S12xx product family, Teridian's new generation of System-on-Chip products for smart card readers. The 73S1215F is the ultimate solution to build USB-connected smart card readers. Two available package options (QFN44 and QFN68) address physical constraints required by handheld PINpad card readers and smart card reader modules built-into laptops, desktops and PC peripherals (keyboards, etc). Alternatively, the 73S1215F is available in die form for chip-on-board (COB) applications.

The Teridian 73S1215F makes low cost applications such as handheld USB smart card readers for E-banking system more viable by offering an unrivaled level of performance and the most comprehensive set of features at a competitive price level.

In terms of performance, the Teridian 73S1215F offers 24MIPS and is the only 8-bit smart card reader controller IC capable of the encryption required for PIN security or protection of in-field firmware upgrade files sent from the host. The Teridian 73S1215F also supports high speed communication with the card and is fully EMV 4.1 compliant.

Teridian provides a free-of-charge CCID reference design (embedded firmware) that can be used as a turnkey solution to build low-cost USB or ExpressCard™ smart card reader modules for desktop and notebook PCs, removing the need for any code development. This reference design is compatible with Windows™ standard CCID driver, or with Teridian's proprietary CCID driver which supports additional features such as PINpad, display, multi-card slots, that are not supported by Windows™ CCID driver.

For immediate technical information and the name of a local representative or distributor, **visit www.teridian.com**, send an e-mail to support@teridian.com or call (714) 508-8800.

73S1215F Block Diagram

Analog DC input
Voltage detection, battery supervision...

JTAG Interface
Powerfull & Cost-effective In-Circuit-Emulation & programming

Security fuses
Prevent from unauthorizatied intrusion

Main oscillator: 4MHZ to 16MHz
Requires an external crystal

32KHz Sub-system oscillator with RTC
Requires an external crystal
Also features a 2nd watchdog timer

USB 2.0 full-speed
4 end-points and dedicated FIFOs

5x6 PINpad interface
Hardware scan & Debounce
Keypress interrupt

General purpose I/Os
From 8 to 15 (depending on package option)
*Can be set independently as inputs, outputs,
edge or level sensitive, interrupt*

LED outputs
2 or 4, depending on
package option
Current programmable

High performance 80515 core:
- 1 clock cycle / instruction
- Up to 24 MIPS available: As powerful as an ARM 7
- Instruction set compatible with industry 8051 / 8052

*Allows encryption of PIN, encryption of data
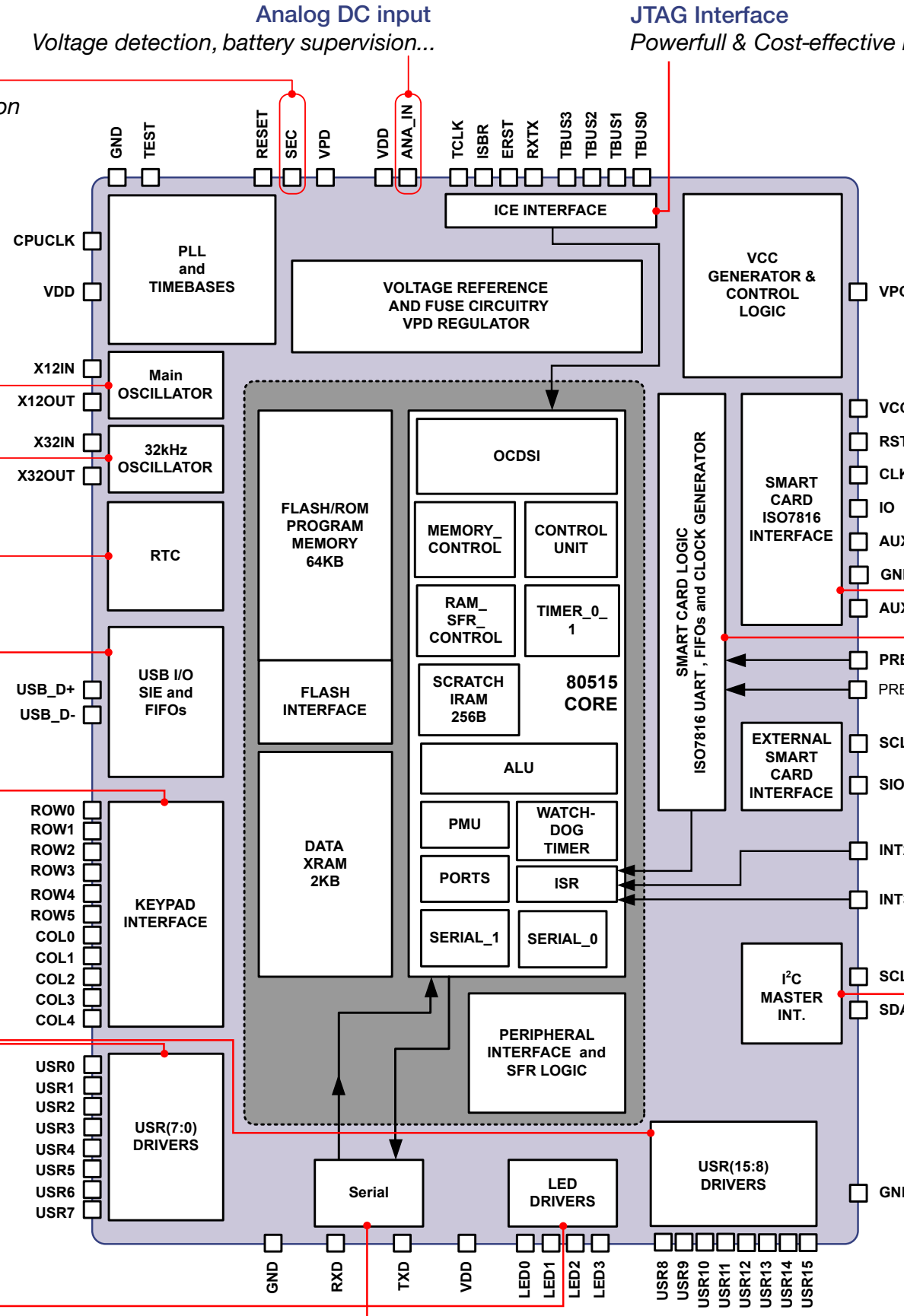exchanged over the USB, etc.*

Memories:
- 64KB Flash / ROM
- 256B Scratchpad IRAM
- 2KB RAM (user XRAM)

Smart Cards:
- Built-in ISO7816-3 / EMV4.1 electrical interface
- ISO7816 UART (supports up to 115kbps speed) with 2 dedicated FIFOs
- I²C Interface to drive external 73S8010x interfaces

Packages
QFN44 7x7mm   QFN68 8x8mm

Asynchronous serial interface
w/ Baud generator, up to 115kbps

Power Supply:
Digital: 2.7V to 3.6V
Analog: 4.75V to 5.5V

Block diagram labels

Top pins: GND, TEST, RESET, SEC, VPD, VDD, ANA_IN, TCLK, ISBR, ERST, RXTX, TBUS3, TBUS2, TBUS1, TBUS0

Left pins: CPUCLK, VDD, X12IN, X12OUT, X32IN, X32OUT, USB_D+, USB_D-, ROW0, ROW1, ROW2, ROW3, ROW4, ROW5, COL0, COL1, COL2, COL3, COL4, USR0, USR1, USR2, USR3, USR4, USR5, USR6, USR7

Right pins: VPC, VCC, RST, CLK, IO, AUX1, GND, AUX2, PRES, PRES, SCLK, SIO, INT2, INT3, SCL, SDA, GND

Bottom pins: GND, RXD, TXD, VDD, LED0, LED1, LED2, LED3, USR8, USR9, USR10, USR11, USR12, USR13, USR14, USR15

Blocks: PLL and TIMEBASES, ICE INTERFACE, VOLTAGE REFERENCE AND FUSE CIRCUITRY VPD REGULATOR, VCC GENERATOR & CONTROL LOGIC, Main OSCILLATOR, 32kHz OSCILLATOR, RTC, USB I/O SIE and FIFOs, KEYPAD INTERFACE, USR(7:0) DRIVERS, FLASH/ROM PROGRAM MEMORY 64KB, OCDSI, MEMORY_CONTROL, CONTROL UNIT, RAM_SFR_CONTROL, TIMER_0_1, SCRATCH IRAM 256B, 80515 CORE, FLASH INTERFACE, ALU, DATA XRAM 2KB, PMU, WATCH-DOG TIMER, PORTS, ISR, SERIAL_1, SERIAL_0, PERIPHERAL INTERFACE and SFR LOGIC, SMART CARD LOGIC ISO7816 UART, FIFOs and CLOCK GENERATOR, SMART CARD ISO7816 INTERFACE, EXTERNAL SMART CARD INTERFACE, I²C MASTER INT., Serial, LED DRIVERS, USR(15:8) DRIVERS